CALIFORNIA OAK MORTALITY TASK FORCE REPORT
TO THE BOARD OF FORESTRY
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***Note*: The COMTF report is produced 11 times a year. There will NOT be a report in January 2013. The next report will be issued February 5, 2013.**

MANAGEMENT

Phytophthora ramorum* Hazard and Risk to the Eastern US - Establishment of *P. ramorum in the Appalachian Mountains would pose the greatest threat to vegetation in the Eastern U.S., according to a Hazard map developed by modelers out of Chris Gilligan's lab at Cambridge University.

The Hazard map represents the spatial distribution of Hazard, not risk. The Cambridge modelers explain that a Hazard map shows the importance of each site in terms of that site's impact on a potential future epidemic. The value of Hazard at any location in the map is a measure of the damage that would be done if that particular site became infected. Specifically, each location is given a value (its Hazard) that reflects the average size of an infestation that would occur if an introduction occurred and an outbreak started at that location. They define the size of the epidemic in biomass terms as a volume measure of damage. In contrast, the Gilligan group defines a risk map as representing the probability of a particular location becoming infected. As such, a risk map represents the chance that a location will become infected, whereas, a Hazard map represents the impact of a particular site becoming infected on the development of the epidemic.

The map uses a scale of 0 to 5, where 0 represents no damage and 5 represents the most damage. The map was calculated using a 2-year time horizon; the hazard value for each location is the size of the epidemic after two years. To develop this hazard map, the US landscape was divided into 250m x 250m grid squares representing over 100 million locations. Due to limitations of file size, the provided image is a more coarse-grained version with each pixel representing 1km x 1km square. This hazard map is an output from a dynamic, spatially explicit, stochastic epidemiological model of disease spread; it incorporates the effects of temporal variation in environmental suitability, the effects of host density and host connectivity, and also allows for the stochastic dynamical spread of the pathogen itself.

This work was primarily carried out by Dr. Erik DeSimone, Dr. Nik Cunniffe, and Rich Stutt in consultation with Professor Chris Gilligan, Head of the Epidemiology and Modeling Group at Cambridge, and was funded by the USDA. More about this and other epidemiological modeling work from the Gilligan group may be found at http://www.plantsci.cam.ac.uk/research/chrisgilligan.htmlor by emailing Stutt at rs481@cam.ac.uk.

RESEARCH

Research at the National Ornamental Research Site at Dominican University of California (NORS-DUC) has provided two Green technology *P. ramorum* soil remediation deliverables that have been approved by the USDA Animal and Plant Health Inspection Service on a case by case basis for use in destroying *P. ramorum* in the soil substrate at contaminated nurseries. Both technologies (steaming and the use of a biological control agent) have been successfully tested at a contaminated retail nursery and a contaminated wholesale nursery (ships interstate) in CA. Follow-up sampling for the pathogen at both nurseries was negative, allowing each site to be released from the *P. ramorum* federal quarantine.

Technology transfer of these NORS-DUC successes to a wider national nursery audience is underway in a proposed multi-state Farm Bill proposal spearheaded by the Oregon Department of Agriculture, Washington State Department of Agriculture, WA State University and CA Department of Food and Agriculture.

Blomquist, C.L.; Rooney-Latham, S.; Soriano, M.C.; and McCarty, J.C. 2012. First Report of *Phytophthora ramorum* Causing a Leafspot on *Loropetalum Chinese*, Chinese Fringe Flower in California. Plant Disease, 96(12): 1829-1829.

Abstract: Chinese fringe flower is a popular landscape plant in California for its red evergreen foliage and its showy red flowers in the spring. In April 2007, a sample was submitted to the California Department of Food and Agriculture diagnostic laboratory from Sacramento County as part of an inspection of a nursery for *Phytophthora ramorum*. A sample was taken from *Loropetalum chinense* because the inspector noticed very small spots and defoliation in the crop, even though *P. ramorum* was not detected in previous samples sent to the lab with similar symptoms. Six 5-mm^2 pieces of the leaves were placed on CMA-PARP (1) medium as part of our standard nursery screening, even though no lesions were seen. An organism with coralloid coenocytic hyphae, chlamydospores, and ellipsoidal semi-papillate sporangia matching the description of *P. ramorum* (2) grew into a snowflake-shaped colony from two pieces. On closer inspection of the leaves, small green lesions of approximately 3 to 5 mm wide were visible, especially when the leaves were backlit. For sporangial production, a 6-mm plug was transferred from the colony margin of the isolate onto V8 juice agar (V8). Sporangia, produced on V8 plugs incubated in dH_20 for 2 days, were from 41 to 61 × 23 to 32 μm (48.7 × 29.3 μm average) with a length to breadth ratio from 1.3 to 2.0 (average 1.7). Chlamydospores on CMA-PARP were 36.7 to 60.1 μm (49.1 μm diameter average). From 2008 to 2011, similar symptoms were found on *L. chinense* from Contra Costa, San Joaquin, and Los Angeles Counties. The same organism was isolated from these infected plants. To confirm pathogenicity on *L. chinense*, five nursery-grown plants in 3.78-L pots were inoculated with three isolates each. Plants were inoculated with 6-mm plugs taken from the margin of a 7- to 10-day old culture grown on V8. Plant leaves were wounded with a sterile pushpin and two colonized plugs were covered with a freezer tube cap filled with sterile dH_2O and attached to the underside of the leaves with a sterile pin-curl clip (4). Inoculated plants were sprayed with water, covered with plastic bags, and incubated

for 2 days, when bags and plugs were removed. Four leaves per isolate were inoculated on each plant and four leaves per plant were treated similarly with uncolonized V8 plugs as a control. Plants were incubated for 12 to 14 days at 18°C (16-h photoperiod) when lesions were visible and some of the leaves began to abscise. *P. ramorum* grew from each lesion produced on inoculated leaves and no *Phytophthora* spp. grew from the control leaves when isolated onto CMA-PARP. Inoculations were repeated with similar results. The internal transcribed spacer region (ITS) of rDNA was amplified and sequenced from the isolates using ITS1 and ITS4 primers as described by White et al. (3). BLAST analysis of the sequenced amplicons (GenBank JQ361743 through JQ361745) showed 100% identity with the ITS sequence of *P. ramorum* (GenBank AY594198). *P. ramorum* is a quarantine pathogen with many hosts (2,4). Leaf spots on *L. chinense* caused by *P. ramorum* are inconspicuous and missing this disease during nursery inspections could lead to unintended spread to neighboring host plants.

Dodd, R.S.; Mayer, W.; Nettel, A.; and Afzal-Rafii, Z. 2012. Clonal Growth and Fine-Scale Genetic Structure in Tanoak (*Notholithocarpus densiflorus*: Fagaceae). Journal of Heredity. doi:10.1093/jhered/ess080.

Abstract: The combination of sprouting and reproduction by seed can have important consequences on fine-scale spatial distribution of genetic structure (SGS). SGS is an important consideration for species' restoration because it determines the minimum distance among seed trees to maximize genetic diversity while not prejudicing locally adapted genotypes. Local environmental conditions can be expected to influence levels of clonal spread and SGS, particularly in the case of disturbance regimes such as fire. Here, we characterize fine-scale genetic structure and clonal spread in tanoak from drier upland sites and more mesic lowland woodlands. Clonal spread was a significant mode of stand development, but spread was limited on average to about 5–6 m. Gene dispersal was decomposed into clonal and sexual components. The latter varied according to whether it was estimated from all ramets with the clonal component removed or for a single ramet per genet. We used the difference in these 2 estimates of gene dispersal as a measure of the effect of clonality on effective population size in this species. Although upland sites had a greater number of ramets per genet, most of the other indices computed were not significantly different. However, they tended to show greater heterozygote excess and shorter gene dispersal distances than the lowland sites. The average distance among inferred sibships on upland sites was approximately at the scale of maximum clonal range. This was not the case on lowland sites, where sibs were more dispersed. We recommend minimum distances among seed trees to avoid selecting clones and to maximize genetic diversity for restoration.

Sniezko, R.A.; Yanchuk, A.D.; Kliejunas, J.T.; Palmieri, K.M.; Alexander, J.M.; Frankel, S.J., tech. coords. 2012. Proceedings of the fourth international workshop on the genetics of host-parasite interactions in forestry: Disease and insect resistance in forest trees. Gen. Tech. Rep. PSW-GTR-240. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. 372 p. Available online at http://www.fs.fed.us/psw/publications/documents/psw_gtr240/.

NURSERIES

Nursery BMPs to be updated - The nursery industry, along with the American Nursery and Landscape Association research branch (the Horticultural Research Institute) and regulators, have begun updating the 2008 "Nursery Industry BMPs for *Phytophthora ramorum* to prevent the introduction or establishment in CA nursery operations". The document, which is based on science and good agricultural practices, is flexible, requiring revisions as advancements in *P. ramorum* nursery research occur.

RELATED ISSUES

The goldspotted oak borer, *Agrilus auroguttatus*, was found for the first time in Riverside County in a recently killed California black oak tree in the mountain community of Idyllwild. The November detection represents the first long-distance movement of the beetle in California from its known area of infestation in San Diego County, 40 miles to the south. It is believed to have made the jump to Idyllwild via infested firewood. The infested tree has been removed; surveys are underway to determine the extent of the infestation.

In February 2012, Chalara dieback of ash (a serious disease of ash trees caused by the fungus *Chalara fraxinea*) was first found in England at a nursery after receiving infected trees from a Netherlands nursery. Since then, it has been found in numerous landscape settings as well as nurseries throughout the United Kingdom (UK) that have received young ash within the past 5 years.

In October and November, UK scientists confirmed a small number of outbreaks in several counties at sites in the wider natural environment, including established woodlands. These sites did not appear to have any association with recently supplied nursery stock, and a cluster of sites, based on proximity to Europe's mainland, raised the possibility of windborne infection. Consequently, ash trees across the UK were checked for signs of the disease in November in a "rapid survey" involving hundreds of Forestry Commission and Food & Environment Research Agency staff as well as volunteers from woodland-owning charities. Plant health experts are also surveying more than 1,000 recent planting sites that received saplings from nurseries where Chalara dieback has been found. As of November 22nd, there have been 257 UK confirmed locations, including: 17 nursery sites, 105 recently planted sites, and 135 wider environment (e.g. established woodland) sites.

The UK government will be announcing a national disease control strategy after studying survey results and research evidence as well as consulting with mainland Europe, where the disease has caused widespread damage to ash in several countries (dieback was first observed in Poland in 1992, but the cause was unknown at the time). The most frequently found ash species in Britain is common ash (*Fraxinus excelsior*). For more information, including a map of confirmed locations, go to http://www.forestry.gov.uk/chalara.

RESOURCES

The Don't Move Firewood campaign has posted an "Interview with Sudden Oak Death Pathogen" to its website at http://www.dontmovefirewood.org/videos/interview-sudden-oak-death-pathogen.html. In the humorous video, Sudden Oak Death and a talk show host have an informative "talk" about what plants are affected, how to prevent the spread, and more. The video was developed by the Don't Move Firewood campaign, along with assistance from the COMTF and funding from the USDA FS Pacific Southwest Research Station.

CONDOLENCES

Howard Kuljian, his wife Mary Scott, and their son Gregory passed away on November 24th after a tragic accident at Big Lagoon beach in Humboldt County. They are survived by their daughter Olivia. A fire ecologist at Six Rivers National Forest, Howard's work on Sudden Oak Death as it relates to fire has been a valuable resource. He, his wife, and son will be missed.